

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

## FINAL EXAMINATION

TRIMESTER 2, 2016/2017

### EME4066 – OPERATIONS RESEARCH

( All sections / Groups )

11 MARCH 2017  
2.30 p.m – 4.30 p.m  
( 2 Hours )

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#### INSTRUCTION TO STUDENT

1. This question paper consists of 3 pages with 4 questions only.
2. Attempt ALL questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.
4. All necessary working **MUST** be shown.

**Question 1**

FET Bhd. assembles two computer products, A and B. A market survey indicates the daily demand for A cannot exceed B by 2.5 units in average. To assemble one unit of A requires 2 man-hours and B requires 5 man-hours. The man power is available only 15 man-hours per day. The profit per unit of A and B are RM 300 and RM 400 respectively.

- Formulate an IP model for this problem in order to obtain maximum daily profit. [5 marks]
- Use a graphical approach to solve this problem. [10 marks]
- Use branch-and-bound approach to solve this problem. [10 marks]

**Question 2**

MMU Bhd. manufactures robotic arm. Currently, the company has a plant in Melaka and a plant in Cyberjaya. The CEO of MMU Bhd. is deciding where to build a new plant either at Nusajaya or Kulaijaya. Table Q2 shows present demand, capacity and freight cost between each plant and each warehouse.

Table 1: Delivery Cost per 1000 kg to Warehouse

		Warehouse			Capacity
		Kuala Lumpur	Seremban	Muar	
Current Plant	Cyberjaya	RM 100	RM 75	RM 50	150
	Melaka	RM 80	RM 60	RM 90	225
Proposed Plant	Kulaijaya	RM 40	RM 50	RM 90	350
	Nusajaya	RM 110	RM 70	RM 30	350
Demand		200	100	400	

- Use the least cost rule to construct an initial solution. (You need to build two tables, one is current plants and Kulaijaya, another one is current plants and Nusajaya) [10 marks]
- Determine the optimal production schedule distribution and total cost by using stepping-stone method for each proposed plant. Which location should the CEO select? [15 marks]

Continued....

**Question 3**

- a) Pizza Ong and Mc. Menang are two competing restaurants. Each must determine simultaneously whether to undertake small, medium, or large advertising campaigns. Pizza Ong believes that it is equally likely that Mc. Menang will undertake a small, a medium, or a large advertising campaign. Given the actions chosen by each restaurant, Pizza Ong's profit as compared to Mc. Menang are as shown in Table Q3a.

**Table Q3a: Expected Profit from actions chosen**

Pizza Ong	Mc. Menang		
	Small	Medium	Large
Small	RM 6000	RM 5000	RM 2000
Medium	RM 5000	RM 6000	RM 1000
Large	RM 9000	RM 6000	RM 0

Pizza Ong has decided to use the following tools in making the decision. Determine the following criteria:

- i) Maximax Criterion; [ 3 marks]
- ii) Maximin Criterion; [ 3 marks]
- iii) Minimax Regret Criterion; [ 5 marks]
- iv) Equal Likelihood Criterion. [ 5 marks]

- b) Find the value and the optimal strategies for the two-person zero-sum games in Table Q3b.

[ 9 marks]

**Table Q3b**

1	2	3
2	0	3

**Question 4**

Ali, Baba, and Chris is a clinic serving the needs of general public on a first-come, first served basis. The clinic has three doctors. Patients arrive at the rate of five per hour, according to a Poisson distribution, and do not balk or renege. The average time required for a doctor checkup is 30 minutes, according to an exponential distribution.

- a) What is the probability that no patients are in the clinic? [7 marks]
- b) What is the probability that six or more patients are in the clinic? [7 marks]
- c) What is the average number of patients waiting in the lobby? [7 marks]
- d) What is the average total time that a patient spends in the clinic? [4 marks]